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THE VISITORS OF THE CAPRIFOLIACEÆ.

JOHN H. LOVELL.

THE Caprifoliaceæ, or honeysuckle family, are remarkable for the variation in length of the corolla tube and the consequent adaptation of the flowers to a great variety of visitors. The wheel-shaped flowers of *Sambucus* contain no honey and are sparingly visited by flies and pollen-collecting bees; *Viburnum*, which has also a rotate corolla but secretes nectar, attracts a wide circle of bees, flies, beetles, and Lepidoptera; the corolla of *Symphoricarpos* is bell-shaped and visited chiefly by wasps; the funnel-formed flower of *Linnæa* is adapted to slender flies; *Lonicera alpigena* is a wasp flower; a part of the species of *Lonicera* are visited by bees in general, while others are pollinated only by bumblebees; *L. caprifolium* and *L. periclymenum* are nocturnal flowers fertilized by hawk moths; and *L. sempervirens* is pollinated by humming birds.

There are about 260 species widely distributed throughout the northern hemisphere and blooming in spring and midsummer. A few occur in South America and Australia. Their northern distribution, as well as the occurrence of fossil forms, indicates their origin in the north temperate zone. *Viburnum* is found in the Dakota group, which, according to Saporta and Marion, belonged to a woody and mountainous region, populated by such genera as *Salix*, *Fagus*, *Populus*, and *Platanus*, and from which southern types, especially the palms, are absent.

SAMBUCUS L.

The flowers attract very few visitors, as they contain no nectar.

Sambucus pubens Michx. Red-berried Elder.

The flower buds are at first green, changing to purplish, and finally, on expanding, to white. Cymes thyrsoïd, longer than broad.

Visitors : Hymenoptera — Apidæ : (1) *Apis mellifica* L., ♀ ; Andrenidæ : (2) *Andrena vicina* Sm., ♀.

Diptera — Syrphidæ : (3) *Syrphus ribesii* L.

Coleoptera — Cerambycidæ : (4) *Pachyta monticola* Rand ; Mordellidæ : (5) *Anaspis rufa* Say. Waldoboro, May 19 to June.

Sambucus canadensis L. *American Elder.*

The broad, flat cymes are very numerous and conspicuous. The flowers attract very few visitors, as they contain no honey and bloom at midsummer, when they come in competition with many nectariferous blossoms. Only four species of flies have been collected, and repeatedly the blossoms were examined without observing a single visitor, and yet upon the jewel-weed (*Impatiens*) and the red-osier cornel, a few yards away, scores were at work. The perfume is agreeable and increases in the evening, but fails to attract crepuscular insects. The stamens are slender, surpassing the nearly sessile stigmas.

Visitors : Diptera — Syrphidæ : (1) *Mesogramma marginata* Say ; Sarcophagidæ : (2) *Helocobia helcis* Town. ; Muscidæ : (3) *Lucilia cornicina* Fab. ; Anthomyidæ : (4) *Phorbia fusciceps* Zett. Waldoboro, July.

Sambucus nigra L. *Black Elder.*

A variety of this species, *S. nigra laciniata* (Mill.) DC., has escaped from cultivation at Cape May, N. J. According to Knuth, the flowers of *S. nigra* are yellowish-white, honeyless, and conspicuousness is gained by their aggregation in a dense corymb. There are few visitors, partly because the strong scent is probably repellent to bees, and partly because of the absence of nectar. In the Island of Föhr, Knuth collected two flies feeding upon the pollen, and in Helgoland a single fly, *Lucilia cæsar*. In middle and southern Germany, Müller observed six flies, two beetles, and one sawfly.

VIBURNUM L.

There are fourteen species in the Northern States. The flowers are in compound cymes, which bloom in early spring or midsummer, and are white, fragrant, and nectariferous.

Viburnum alnifolium Marsh. *Hobble Bush.*

The inflorescence is in broad, flat corymbs of flowers of two different sizes. The center florets are small, 5 mm. broad, white tinged with red, and in autumn produce bright-red berries; while the marginal ones, a single row of which surrounds the corymb, are large, 20 mm. broad, white, and sterile. Their size has been increased at the expense of their fruitfulness, and as their use is to attract the attention of insects, they open a day or two in advance of the inner and smaller florets. "The older flowers are actually occupied," Kerner remarks, "in the allurements of insects for the advantage of the younger ones." Since their conspicuousness is useless to themselves but of benefit to the community, they may be said unconsciously to play the part of benefactors. The stamens stand nearly erect, and spontaneous self-fertilization can easily occur by the pollen falling upon the sessile stigmas.

Visitors: Hymenoptera — Apidæ: (1) *Apis mellifica* L., ♀; (2) *Bombus bifarius* Cr., ♀; (3) *Nomada maculata* Cr., ♀; Andrenidæ: (4) *Andrena* sp.; (5) *A.* sp.

Diptera — Syrphidæ: (6) *Syrphus ribesii* L.; (7) *Brachypalpus marginatus* Hunter; Muscidæ: (8) *Myiospila mediatunda* F.; Cordyluridæ: (9) *Scatophaga stercoraria* L.

Coleoptera — Elateridæ: (10) *Elater rubricus* Say; (11) *Megapenthes rogersii* Horn¹; Cerambycidæ: (12) *Cyrtophorus verrucosus* Oliv.; (13) *Microclytus gazellula* Hald.; Cedermeridæ: (14) *Asclera ruficollis* Say; Mordellidæ: (15) *Anaspis rufa* Say; also *Pachyta monticola* Rand.

Hemiptera — two species. Waldoboro, May 9-19.

Viburnum lentago L. *Sweet Viburnum.*

The flowers are homogamous. The stamens are much longer than the stigmas and divergent; self-fertilization is not, how-

¹ In his list of Coleoptera from the southern shore of Lake Superior, 1896, Prof. H. F. Wickham remarks: "Of the Elateridæ it is a pleasure to record the capture of a fine specimen of *Megapenthes rogersii*, a rare insect recorded hitherto only from Canada." The specimen taken by the writer was determined by Professor Wickham.

bæidæ: (10) *Hoplia trifasciata* Say; (11) *Macroductylus sub-spinosus* Fab.

Hemiptera — one species. Waldoboro, July 6–10.

Viburnum cassinoides L. Withe Rod.

The structure of the flowers is very similar to that of the preceding species. The perfume is distinct, and the flowers contain honey.

Visitors: Hymenoptera — Andrenidæ: (1) *Andrena vicina* Sm., ♀; (2) *Halictus palustris* Rob., ♀.

Lepidoptera — Rhopalocera: (3) *Lycæna pseudargiolus* Boisd. & Lec.

Diptera — Syrphidæ: (4) *Sphærophoria cylindrica* Say; (5) *Syrphus ribesii* L.; Empididæ: (6) *Empis pubescens* Loew; (7) *Rhamphomyia luteiventris* Loew; Sapromyzidæ: (8) *Sapro-myza longipennis* Fab.

Coleoptera — Elateridæ: (9) *Agriotes stabilis* Lec.; (10) *A. fucosus* Lec.; Lampyridæ: (11) *Telephorus fraxini* Say; Cerambycidæ: (12) *Leptura mutabilis* Newm.; (13) *Pachyta monticola* Rand; (14) *Molorchus bimaculatus* Say; Cistellidæ: (15) *Isomira quadristriata* Coup. Waldoboro, June 26–28.

In *V. pubescens* Pursh and *V. prunifolium* L. the flowers are homogamous, and spontaneous self-fertilization and geitonogamy may occur. (Robertson, *Bot. Gaz.*, Vol. XXV, No. 4.)

	APIDÆ.	ANDRENIDÆ.	OTHER HYMENOPTERA.	SYRPHIDÆ.	EMPIDIDÆ.	OTHER DIPTERA.	COLEOPTERA.	LEPIDOPTERA.	TOTAL.	DATE.
<i>V. prunifolium</i> , Illinois, Rob. .	9	26	2	17	2	13		7	76	April 24–29
<i>V. pubescens</i> , Illinois, Rob. . .	6	21		7	13	7	18	2	73	May 4–9
<i>V. opulus</i> , Germany, Müller . .		1		6	1	1	7		16	
<i>V. alnifolium</i> , Maine	3	2		2		2	6		15	May 9–19
<i>V. lentago</i> , Maine	1	6		7	1	1	5	1	22	June 16–21
<i>V. cassinoides</i> , Maine		2		2	2	1	7	1	15	June 26–28
<i>V. dentatum</i> , Maine		2					7		11	July 6–10

An examination of the table shows that the most important visitors are Andrenidæ, flies, and beetles, to which the inflo-

rescence, with its freely exposed honey, is well adapted. The long-tongued bees are comparatively rare. The smaller bees are very efficient pollinators, and the species are both numerous and common. The absence, as a rule, of other Hymenoptera is noteworthy. Of Diptera the Syrphidæ and Empididæ are the most important. The latter are most abundant in May, the time of blooming of several species of *Viburnum*. Many minute flies also seek the flowers. Beetles are very frequent visitors to all the species except *V. prunifolium*, to which none are recorded. This is certainly remarkable, and further observations are desirable. Delpino included *V. opulus* among the flowers adapted to beetles, but Müller regarded flies as the most efficient pollinators. The variety of Coleoptera is interesting, as the twenty-six visits I have enumerated were made by twenty-one species. Lepidoptera are rare, as the long proboscis of these insects is not adapted to suck the honey in rotate flowers.

SYMPHORICARPOS JUSS.

There are a few flowers which are adapted to wasps, and to which these insects are very frequent visitors. The most important wasp flowers are *Epipactis latifolia* Swartz, *Cotoneaster vulgaris* Lindl., *Scrophularia nodosa* L., *Symphoricarpos racemosus* Michx., and *Lonicera alpigena* L., the last two belonging to the Caprifoliaceæ. The flowers agree in having abundant honey secreted in a short corolla, or pouch-like receptacle, about the size of a wasp's head, and usually lurid colors. In England *Epipactis latifolia* is visited by swarms of wasps, which effectually fertilize the plants, and although Darwin saw hive bees and bumblebees of many kinds constantly flying over the plants, he never saw a bee or any dipterous insect visit the flowers. He expresses astonishment that the sweet nectar should not be attractive to any kind of bee.¹ Müller's statement is very clear. He says: "This plant in the Alps often grows on the same rocks to which a wasp (*Polistes gallica*) has attached its stalked, open nests. I have found the flowers visited solely by the above-mentioned wasp, whose head just

¹ Darwin, *On the Fertilization of Orchids by Insects*, p. 102.

fits into the flower.”¹ The same observer found in Westphalia five species of wasps very common visitors to *Scrophularia nodosa*. This flower exhibits retrogressive modification in that the upper fifth stamen, which is useless, is reduced to a sterile black scale.

Symphoricarpos racemosus Michx. Snow Berry.

The small reddish flowers are campanulate and pendulous. The ample supply of honey, secreted by the base of the corolla, is prevented from escaping by numerous slender hairs which line its anterior portion. The short pistil is only about half the length of the corolla, to the sides of which are attached the stamens, with the anthers converging toward the center. The flowers are homogamous. “As the wasp thrusts its head wholly into the flower, it comes at once in contact with all five anthers and then touches with one side the stigma; but on its way to the stigma little or no pollen remains attached to it, partly because the pollen is very slightly adhesive, and partly because any grains that do attach themselves are brushed off before they reach the stigma by the hairs lining the corolla.”² But after the insect’s head has been moistened with honey it acquires a plentiful coating of pollen, which is carried to the next flower.

In Thuringia, according to Müller, nine-tenths of all the visitors belong to five species of wasps; while at Lippstadt, where wasps are much less abundant, the honey bee preponderates. At Rendsburg, Schröder observed that the flowers were visited by numerous Noctuidæ between the hours of 9 and 10 in the evening; in Belgium, Macleod collected nine species of night-flying moths belonging to this family. The more important observations are given in the table³ on the following page.

¹ Müller, *Alpenblumen*, p. 214.

² Müller, *Fertilization of Flowers*, p. 292.

³ Knuth, *Handbuch der Blütenbiologie*, Bd. ii, Nr. 1, p. 527.

	WASPS.	APIDÆ.	ANDREN- IDÆ.	OTHER HYMENOP.	DIPTERA.	TOTAL.
Southern Germany, Müller	7	6	2	1	1	17
Heringsdorf, Knuth	3	2				5
Brandenburg, Loew	4	2			6	12
Bremen, Alfken	2	11				13
Paris, Bonnier	3	2	1			6

Symphoricarpos symphoricarpos (L.) MacM.; *S. vulgaris* Michx.
Coral Berry.

The greenish-white flowers tinged with rose have essentially the same structure as those of the preceding species. The stigma and anthers also mature together. In Illinois, Robertson collected, between July 8 and August 30, the following visitors :

Wasps, 5 ; Andrenidæ, 5 ; Sphecidæ, 1 ; Pompilidæ, 1.¹

LINNÆA L.

A monotypic genus.

Linnæa borealis L. Twin Flower.

One of the most attractive of June flowers is the twin flower, *Linnæa borealis* L., named after Linnæus, with whom it was a special favorite. It extends throughout the eastern Northern States, from Newfoundland and through British America, Alaska, Siberia, and northern Europe to England. It is a trailing evergreen vine densely carpeting the ground in cold, open woodlands. The nodding pinkish blossoms are borne in pairs at the summit of elongated peduncles, and exhale a sweet, vanilla-like fragrance. The funnel-formed corolla is five-lobed, nearly regular, though the two superior lobes are slightly larger. The tube is 8 mm. in length, and for 3 mm. is very small. The inverted position of the flower excludes rain. The lobes are whitish, the tube wine-colored, with a yellow marking on the lower side which serves as a honey guide. The honey is secreted on the same side, at the base of the corolla, between

¹ *Trans. Acad. Sci. of St. Louis*, vol. vii, No. 6, April, 1896.

the two shorter stamens. The stamens are four, included, didynamous, and the anthers dehisce introrsely. The total length of the flower is about 10 mm., of the pistil 11 mm., so that the green capitate stigma is exserted, an arrangement favoring cross-fertilization. A legitimate visitor, in creeping over the edge of the bell, comes in contact first with the stigma and deposits upon it pollen brought from another flower; subsequently, while sucking honey, the underside of its body brushes the anthers of the two longer stamens, and the head touches the anthers of the two shorter. Within the corolla are many inter-crossing hairs, which exclude small, useless flies, which I have seen vainly seeking an entrance. They also afford a foothold to the proper guests.

During a part of an afternoon a large bed of *Linnæa* in full bloom was carefully observed, and eight visitors were collected. On examination they all were found to belong to a single species of fly, *Empis rufescens* Loew, of the Empididæ. Other observations showed that in this locality this fly is the most frequent and perhaps the only pollenizer. In the Alps, Müller observed three Diptera and one butterfly. The butterfly was probably an accidental visitor, as these insects are unusually abundant in the Alps. Loew saw in Brandenburg a long-legged fly, *Neurigona quadrifasciata* F., of the family Dolichopodidæ. This family is closely allied to the Empididæ. The flowers of *L. borealis* L. are, then, in both continents, adapted to slender flies which live in woodlands. I saw a female bumblebee fly over a bed of the flowers without paying any attention to them. Self-fertilization may occur by the pollen falling in some instances upon the stigma.

Visitors: Diptera; Empididæ; *Empis rufescens* Loew, sucking, common. Waldoboro, June to July 6.

LONICERA.

Lonicera ciliata Muhl. American Fly Honeysuckle.

This is the only species of *Lonicera* native in this locality. The pendulous, funnel-formed flowers are sheltered beneath the young leaves. The tube is 10 mm. to 11 mm. long and con-

tains nectar in a spur near the base. Female species of *Bombus*, in their haste to obtain the nectar, frequently puncture the tube a short distance above the spur. The flowers are slightly proterogynous. The stigma usually stands a few millimeters in advance of the anthers, but in several instances I have seen it resting directly against them, so that self-fertilization may occur. The color is greenish-yellow. The flowers are visited by *Bombus vagans* Sm., ♀, and several small bees. The blooming season is from May 7 to 15.

The genus *Lonicera* includes about 100 species, chiefly natives of the north temperate zone. According to the visitors which pollinize the flowers, they may be divided into wasp flowers, bee flowers, bumblebee flowers, hawk-moth flowers, and bird flowers.

1. *Wasp Flowers*.—In the Alps, *L. alpigena* L. is adapted to wasps. The tube is short, with a prominent pouch-like receptacle which contains abundant honey; the entrance is protected by stiff hairs. The lower lip affords a convenient landing place. An insect comes in contact first with the stigma and subsequently with the anthers. Müller states that the flowers are homogamous, but according to Kerner they are proterogynous. The color is reddish-brown. Müller observed in the Alps 2 species of wasps in great numbers; *Bombus*, 3; other bees, 4; Syrphidæ, 2; Lepidoptera, 2; Coleoptera, 2.

2. *Melittophilous, or Bee Flowers*.—*L. tartarica* L. and *L. nigra* L. are visited by both the larger and smaller bees. The stigma and anthers in both species ripen simultaneously and are in close proximity; bees push their way into the flower between them and come in contact with both. Self-fertilization may occur by the insect thrusting the anthers against the stigma. *L. tartarica* is pink or white, with a tube 6 mm. long, and in Germany is visited by: Apidæ, 2; Andrenidæ, 1; Syrphidæ, 1 (Müller). Upon *L. nigra*, Apis, *Bombus*, and numerous smaller bees and flies have been observed.

3. *Bombus Flowers*.—The length of the tube in the bumblebee flowers varies from 3 to 15 mm., while the proboscis of the largest bees is 21 mm. long. The stamens diverge so widely that the smaller bees and flies may never touch the stigma.

Self-fertilization may occur. The color is pale yellow, or yellow.

	LENGTH OF TUBE IN MILLI- METERS.	BOM- BUS.	OTHER HYMEN- OP- TERA.	LEPI- DOP- TERA.	DIP- TERA.	TOTAL.
<i>L. xylosteum</i> , Westphalia, Müller	3- 4	2	I		2	5
<i>L. corulea</i> , Alps, Müller . . .	6- 7	6	II	3	2	22
<i>L. sullivantii</i> , Illinois, Robertson	14-18	2	I		I	4

4. *Sphingophilous*, or *Hawk-moth Flowers*.—*L. caprifolium* L. and *L. periclymenum* L. are adapted to crepuscular and nocturnal Lepidoptera, especially to the hawk moths; while bees are only accidental visitors. The flowers are two-lipped and, when in bloom, stand nearly horizontal. The anthers turn their pollen-covered sides upward, and the whole underside of the moth is covered with pollen. The stigma protrudes so far in advance of the anthers that self-fertilization is not likely to occur. The honey is abundant and is secreted in the lowest part of the corolla tube, while in the non-twining honeysuckles the corolla possesses a honey-forming expansion above the base.¹ The flowers expand in the evening, when they exhale their fragrance most strongly.

L. caprifolium has a tube 30 mm. long and 1 or 2 mm. wide. The color is purplish without and white within. Müller collected upon the flowers in Westphalia: Sphingidæ, 6; other Lepidoptera, 4. The proboscis of the large hawk moth, *Sphinx convolvuli*, is 65 to 80 mm. in length. The fragrance of the honeysuckle is perceived by this moth at a long distance. Kerner removed one of these moths to a part of the garden 300 yards away from the honeysuckle and marked it with cinnabar. "When twilight fell, the hawk moth began to wave the feelers which serve it as olfactory organs hither and thither a few times, then stretched its wings and flew like an arrow through the garden to the honeysuckle." The same observer states that butterflies pass over the flowers without pausing,

¹ Kerner, *The Natural History of Plants*, vol. ii, pp. 177, 178.

and that the fragrance is either unperceived or is unpleasant to them.

The tube of *L. periclymenum* is 22 to 25 mm. long, so that the honey, which may fill the tube for half its length, is also accessible to bumblebees. During the first evening the interior of the flowers is white, and the matured anthers stand directly in front of the entrance, while the stigma is bent abruptly downward. On the second evening the color within has changed to yellow, the stigma has moved upward and stands in front of the flower, while the anthers are in turn bent downward. It is doubtless designed that moths should visit the flowers in the first stage before those in the second. Knuth was, however, unable to determine in the evening which kind of flowers was sought first, as the moths move with great rapidity. In this connection the color change is probably of not much significance. The hawk-moth flowers were once bumblebee flowers, with yellowish coloration. After the hawk moths had dispossessed the bees, the production of yellow pigment was no longer beneficial, and consequently tended to disappear. Its reappearance in the older flowers is due partly to reversion and partly to oxidation, for the flowers in wilting continue to darken and turn a dingy orange-brown. Moreover, yellow is probably as conspicuous as white in the evening, and nocturnal flowers, as the evening primrose, *Oenothera biennis*, may be yellow-colored.

On the Island of Föhr, Knuth collected: Sphingidæ, 5; Noctuidæ, 1; Diptera, 4; Bombus, 1. The same observer saw in Helgoland: Sphingidæ, 2; Noctuidæ, 2. Heinsius saw in Holland: Bombus, 1, as well as many pollen-eating flies. Macleod observed in Belgium: Bombus, 2; Sphingidæ, 1.

5. *Ornithophilous or Bird Flowers*. — *L. sempervirens* L. is fertilized by the ruby-throated humming bird. The narrow tube is 25 to 35 mm. long, with a regular limb. The color is scarlet outside, yellow within, or rarely throughout. The flower is scentless. Crimson or scarlet is the characteristic color of bird flowers, as *Lobelia canadensis* and *Tecoma radicans*. Red appears to be the favorite color in bird æsthetics, and a larger number of edible fruits display this hue than any other. Of

the fourteen species of *Lonicera* in the Northern States, ten have red berries, one yellow, and three black, or bluish-black. The original color of *L. sempervirens* was undoubtedly yellow, to which it occasionally reverts. This color change is very common and may occur in the course of the development of the individual flower. In certain South American species of *Lantana* the flowers are at first yellow, when they are visited by bees, and later change to red, and are then attractive to butterflies. *L. sullivantii* is also visited by the humming bird.

DIERVILLA MÆNCH.

This genus is confined to North America and consists of two species; one is distributed throughout the north temperate zone, the other is found in the mountains of the Southern States.

Diervilla diervilla (L.) MacM.; *D. trifida* Mæench.
Bush Honeysuckle.

The northern species, *D. diervilla*, is a low shrub growing in rocky woodlands and thickets. The flowers are solitary or in few-flowered cymes. The corolla is funnel-formed, more or less two-lipped, with a tube 7 mm. long, light yellow, the upper lobe marked with an orange honey guide. The honey, which is abundant and may fill the tube for 3 mm. of its length, is secreted by a thick quadrangular gland at the base of the tube on the upper side. The lower portion of the filaments, style, and middle lower petal are bearded, the hairs serving to exclude small insects and the wet. The odor is very faint or absent. The older flowers turn reddish, a color change which also occurs in *Ribes aureum* and in the genera *Weigelia*, *Fuchsia*, and *Lantana*. In *Ribes aureum*, Müller states that the more intelligent insects immediately recognize those flowers which no longer contain nectar, and consequently visit more blossoms in the same time.¹ Repeated observations failed to show that the color change in *D. diervilla* was of the same signifi-

¹ *Fertilization of Flowers*, p. 251.

cance. The honey bee was observed to visit the red flowers both when solitary and when associated with yellow flowers. Neither was there any preference manifested for yellow flowers when flowers of both colors occurred in the same cyme. Examination showed that the reddish flowers continued to secrete honey abundantly. This is an instance, not uncommon, of a flower secreting nectar longer than is necessary. The stems and leaves are frequently reddish, due probably to oxidation, and the reddish color of the older flowers appears to be due to a similar change in the nutritive fluids.

The flowers are proterogynous. Immediately after the apices of the corolla separate, the stigma protrudes in a receptive condition. At this stage the anthers, which are 4 mm. long, rest directly against the style, the length of which is then 13 mm. and of the stamens 12 mm.; in the older flowers the style lengthens to 19 mm., the stamens to 15 mm. The anthers dehisce introrsely shortly after the expansion of the flower, but as they are shorter than the style, self-fertilization is not likely to occur. As the style lengthens it is bent aside, and the honey bee was observed to visit flower after flower without coming in contact with the stigma.

The length of the corolla tube (7 mm.) and the fact that the anthers are divergent and not in close proximity to the stigma indicate that the flower is adapted to bumblebees. The smaller bee, *Halictus disparalis* Cr., ♀, was seen to try vainly to reach the honey. The most frequent visitor, however, is the honey bee. The larva of the hawk moth, *Hemaris diffinis*, feeds upon the leaves, and the moth sucks the flowers. Minute flies and a beetle were observed feeding upon the pollen.

Visitors: Hymenoptera — Apidæ: (1) *Apis mellifica* L., ♀, sucking, frequent; (2) *Bombus bimaculatus* Cr., ♀, s.; (3) *Psithyrus (Apathus) laboriosus* Fab., ♀, s.; Andrenidæ: (4) *Halictus* sp.; (5) *H. disparalis* Cr., ♀, collecting pollen; (6) *Halictulus americanus* Ash., ♀; (7) *Augochlora aurata*, Sm., ♀, c. p. None common except the first.

Lepidoptera — Rhopalocera: (8) *Pamphila peckius* Kirby, s.; Heterocera: (9) *Hemaris diffinis*, s., standing on a leaf or poising on the wing. June 29 to July 6. Waldoboro.

WEIGELIA THUN.

The eastern Asiatic species of *Weigelia* are often referred to *Diervilla*, but are regarded as distinct by Britton.¹ An immense number of varieties have been produced in cultivation by selection and hybridization, which are remarkable for their wide range of coloration. There are white and deep-red forms with every intermediate shade; white when opening but changing to rose; deep red in bud but rose-colored in bloom; flower pale rose at first, changing to deep red; yellow; light yellow, changing to white; pale yellow, changing to pale rose; and reddish-purple. The leaves are also frequently highly variegated with yellow and white.

Weigelia rosea Lindley.

The trumpet-shaped flowers were observed by Müller in Germany to be visited by *Osmia rufa* L., ♀, and also by *Halictus leucopus* K., ♀, and *H. sexnotatus* K., ♀. These small bees creep into the corolla tube, the mouth of which is 8 to 10 mm. in diameter, to obtain the nectar. They come in contact first with the stigma, which surpasses the anthers, and then with the pollen-covered anthers. The flowers are stated to be proterogynous, but not to the exclusion of self-fertilization. Knuth saw *Bombus agrorum* F., ♀, frequently visit the flowers in his garden. There is not, however, sufficient room for the larger bees to enter the flower conveniently.²

¹ Britton and Brown, *Illustrated Flora*, vol. iii, p. 242.

² Knuth, *Handbuch der Blütenbiologie*, Bd. ii, Nr. 1, p. 525.